
Brief History of Haptic Computing

History of Immersive Computing

Nov 29, 2024

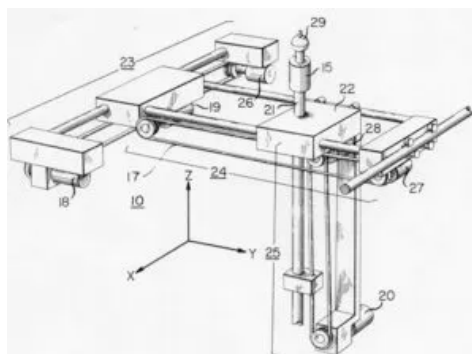
From 1970 to 2024

A **haptic interface** is a system that enables a user to explore digital content using their sense of touch. The word haptics refers to “active touch” and involves sensing force, vibration, and tactile stimuli in coordination with active human motion. A silent alarm (like a pager) is not an example of “active touch” and technically not considered a haptic interface.

Below is a **brief history** of haptic computing, highlighting key milestones. Most items listed are either **core technologies** or **important products** that greatly influenced the field. Note, the word “haptics” did not come into favor until the late 1990's. Prior to that date, the phrase “force feedback” was most commonly used to describe haptic interfaces.

1971 — First 3D Haptic System — Noll

Michael Noll at Bell Labs is credited with inventing the first 3D haptic system for feeling objects represented only in the memory of a computer. The work was published in 1971 [[patent link](#)] and was awarded a patent.



3D Haptic Device (Noll, 1971)

1972 — First Haptic System for Scientific Visualization — Batter & Brooks

Fredrick Brooks and James Batter invented **Grope I**, the first system aimed at enabling scientific visualization using haptic feedback [[paper link](#)].

1976 — First Video Game with Vibration — Sega

In 1976, Sega introduced vibration-only feedback in 1976 in motorcycle game called **Fonz** in which the handlebars shook on crashes. Although limited, it was the first use of physical feedback in a video game.

1988 — First Virtual Reality System with Haptics — Ouh-Young

Ming Ouh-Young developed the first virtual reality system with haptics at University of North Carolina, Chapel Hill. It was invented to allow chemists to explore the 3D structure of molecules and “feel” the binding forces during molecular docking [[paper link](#)]. The concept built off the prior work of Brooks and Batter at University of North Carolina.

1989 — First Video Game with Full Haptics — Hard Drivin', Atari Games

In 1990, Atari shipped a popular arcade game called **Hard Drivin'** that included a one-degree-of-freedom haptic interface within the steering wheel. It let users feel the simulated forces of driving. It was developed by Behensky, Moncrief, Durfey, and Loper in 1989 [[patent link](#)].

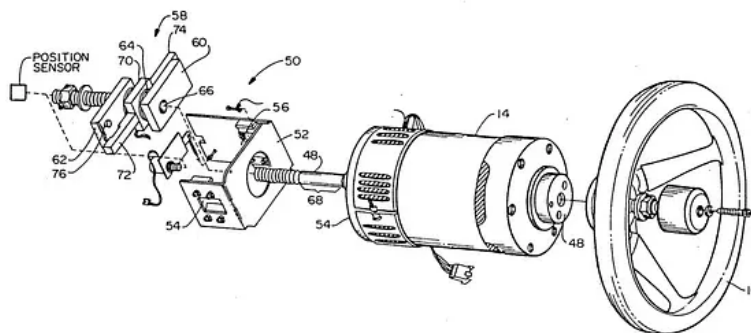


FIG. 2

Haptic Steering Wheel for Hard Driving video game (Behensky, 1989)

1990 — First Haptic Glove for VR Environments — Kramer

Jim Kramer is credited with inventing first haptic glove for virtual reality. The glove was developed at Stanford University as a device for the blind, but was used widely virtual reality [[patent link](#)].

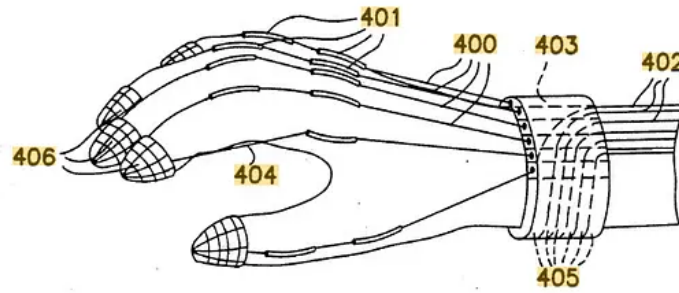
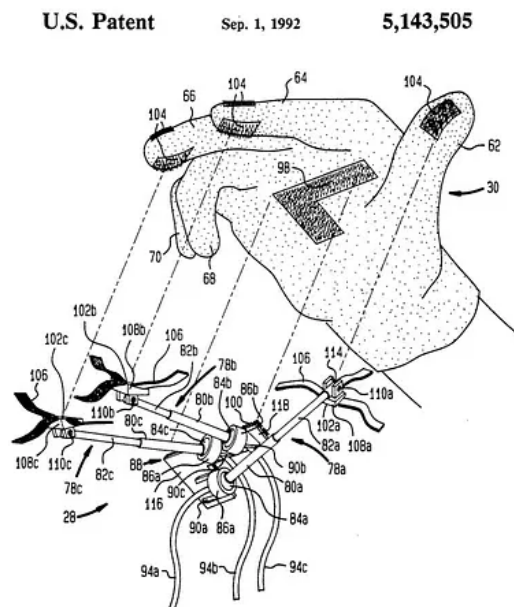


FIG. 4A

First Haptic Glove (Kramer, 1990)

1991 — First Haptic Glove using Pneumatics — Burdea

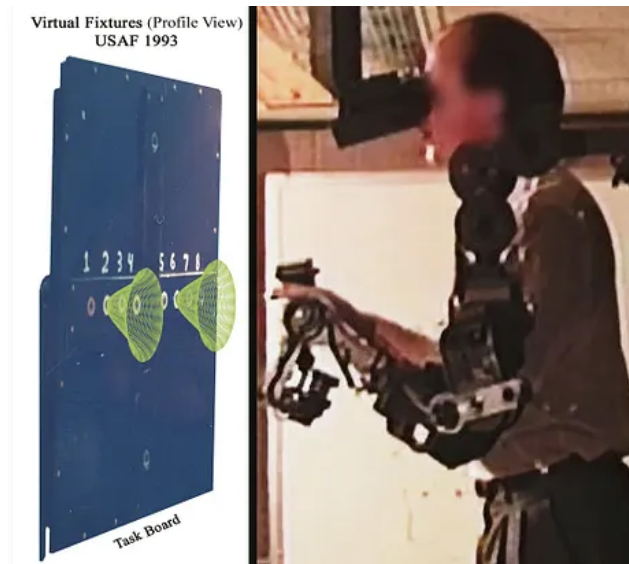
Gregory Burdea of Rutgers University developed the first pneumatic haptic glove. It was created for telerobot control [[patent link](#)] and was prototyped by adapting a non-haptic glove called the **DataGlove** developed by Zimmerman and Lanier at VPL in 1989 [[VPL patent link](#)].



First Pneumatic Haptic Glove (Burdea, 1991)

1992 — First Augmented Reality System with Haptics — Rosenberg

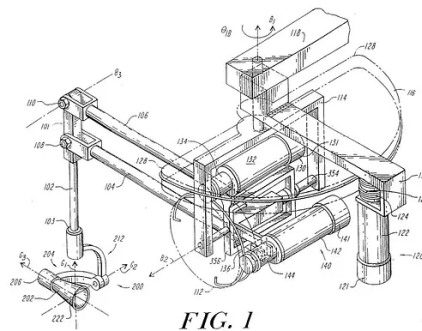
The **Virtual Fixtures Platform** was the first augmented reality system enabling users to interact with real and virtual objects. The system was developed by Louis Rosenberg in 1992 at Stanford and Air Force Research Laboratory [[Air Force link](#)]. It allowed users to feel 3D haptic sensations when real and virtual objects interacted in a mixed reality [[IEEE link](#)].

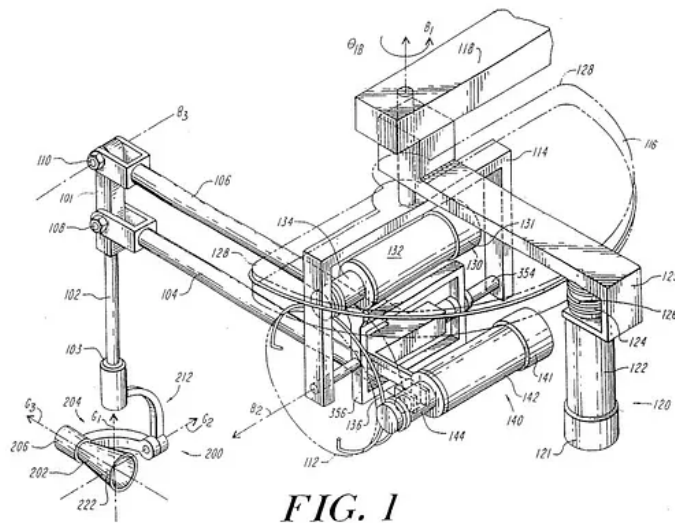


First Mixed Reality (Rosenberg, 1992)

1993 — First 3D Haptic Product — Massie & Salisbury

The first high fidelity 3D haptic product sold widely to researchers was the **Phantom** from Sensable Devices and invented by Massie & Salisbury at Massachusetts Institute of Technology. Sold to universities and research labs, many important haptic experiments and research developments were conducted using Phantom during the 1990s and beyond. [[patent link](#)].





Phantom Haptic Interface (Massie, 1993)

1994 — First Tactile Vest for Video Gaming - Aura Systems

The **Aura Interactor** was a wearable tactile vest developed by Aura Systems for use with gaming consoles. It did not have a software API or any other means for directly controlling tactile sensations. Instead it monitored the audio signals from a game console and use electromagnetic actuators to convert low frequency audio signals into vibrations felt by the user.



First Sound-based Tactile Feedback Vest (Aura, 1994)

1995 — First Haptic GUI — Rosenberg & Brave

The first **Haptic GUI** for windows-style computing was invented by Louis Rosenberg and Scott Brave. It enabled full haptic interactions with pull-down

menus, stretchable windows, draggable icons, movable sliders, and pressable buttons [[patent link](#)] and was demonstrated in [research studies](#) to enhance manual performance. It was deployed commercially by Logitech in 1998 for their Wingman Force Feedback Mouse and in 2000 for their iFeel Mouse. Both enabled haptics across the Windows desktop.

U.S. Patent

US 6,219,032 B1

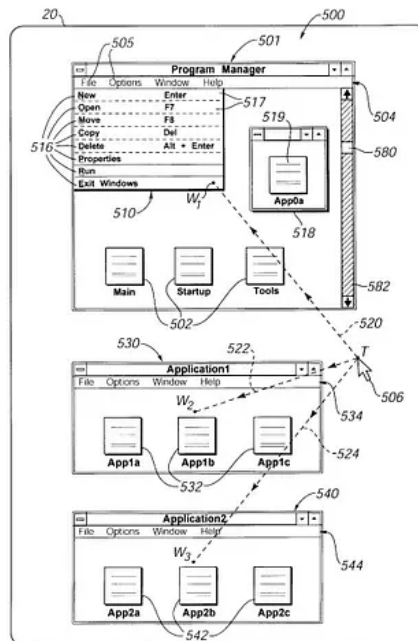


Figure 19

First Haptic GUI (Rosenberg, 1995)

1996 — First Consumer Product with Full Haptics — CH Products

The [first consumer product](#) with full haptics (force and vibration feedback) was the **Force FX joystick** developed by Immersion Corporation and manufactured, marketed and distributed by CH Products [[patent link](#)]. In 1997, similar designs were licensed by Immersion to other manufacturers including Logitech, Gravis, and Thrustmaster.



First Force Feedback Joystick for Consumers (Force FX, 1996)

1996 — First Haptic Web Pages — Rosenberg & Tan

The first system and protocol for enabling haptic sensations to be added to web pages and accessed over the internet was invented by Rosenberg and Tan [patent link]. This haptic web technology was first deployed widely in 1997 when Logitech unveiled the first haptic mouse product and bundled it with desktop, gaming, and web capabilities developed by Immersion.

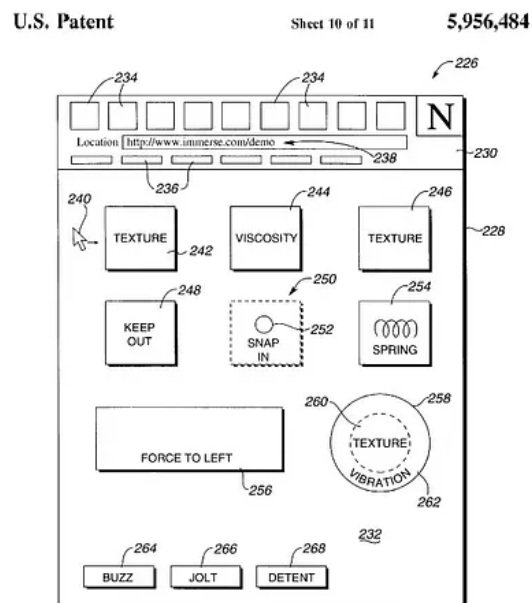


Figure 9a

1997 — First Gaming Console with Vibration Feedback — Nintendo 64

Nintendo launched the N64 in 1997 with an optional **Rumble Pack** that added vibration feedback to games [[patent link](#)]. It was not a full haptic product (vibration only), but popularized the value of the tactile sense in computer gaming. This was soon followed by a competing product from Sony called the Dual Shock controller.



First Console Haptic Device, Nintendo 64 with optional Rumble Pack (Nishiumi, 1997)

1997 — First Microsoft Haptic Product — Sidewinder Force Feedback Pro

The first product from Microsoft was the **Sidewinder Force Feedback Pro** launched for the holiday season of 1997. It shipped with multiple games including Interstate 76 from Activision. It was a highly successful product that gained significant popularity and brought the concept of full haptics to a larger gaming audience.





First Haptic Product from Microsoft (Microsoft, 1997)

1998— First Haptic Mouse products— Logitech

The first haptic mouse was the **Wingman Force Feedback Mouse** launched by Logitech in 1998 and was marketed for gaming. This was followed by the **iFeel Mouse** from Logitech in 2000 for productivity. Both were invented at Immersion and licensed [[patent link 1997](#)][[patent link 1998](#)]. These mouse products were followed in 2001 by mice from other makers, including the HP Force Feedback Web Mouse, the Touch Force Optical Mouse from Saitek and the Nostromo n30 from Belkin, all under license from Immersion.



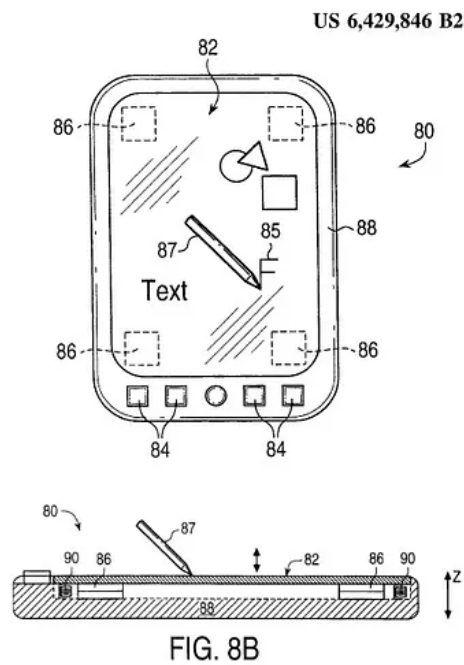
Wingman Force Feedback Mouse - 1998
Developed by Immersion Corporation
Manufactured & Distributed by Logitech



iFeel Mouse - 2000
Developed by Immersion Corporation
Manufactured & Distributed by Logitech

1999 — First Haptic Touchscreen — Rosenberg

The most common use of haptics today is on mobile devices through touchscreens. The first **haptic touchscreen** was invented by Louis Rosenberg at Immersion in 1998 [[patent link](#)]. The first haptic touchscreen products were produced by 3M under license from Immersion [[link](#)].



First Haptic Touchscreen (Rosenberg, 1998)

1999 — First Haptic Product to sell 1,000,000 units — Microsoft

The Microsoft Force Feedback Pro joystick, launched for the holiday season of 1997. In 1999 it became the first haptic full (force and vibration) product to sell over 1 million units [[press release](#)].



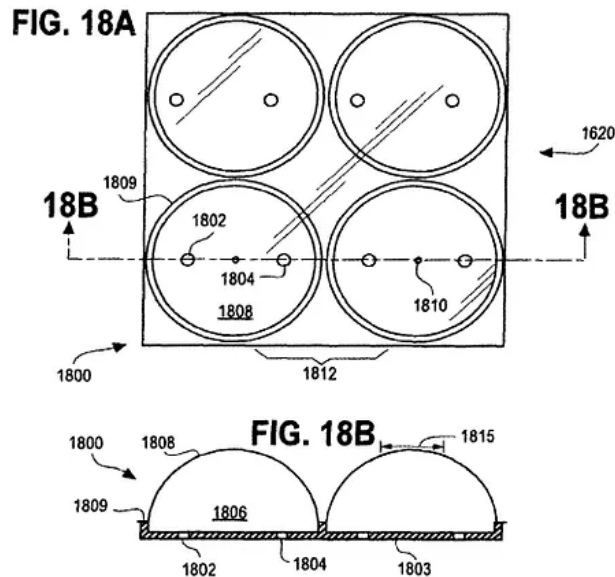
Microsoft Sidewinder Force Feedback hits 1M units sold (Microsoft, 1999)

2008— First Non-Contact “Mid Air” Haptic Device — Iwamoto

The first non-contact haptic device (mid-air haptics) used pressure waves from ultrasonic signals [\[paper link\]](#). The principle is based on a non-linear phenomenon called acoustic radiation pressure. This prototype confirmed the feasibility for use as a tactile display. It was developed by Takayuki Iwamoto and collaborators at The University of Tokyo. Prior to this, in 2006, Iwamoto and team developed a 2D haptic device using ultrasound [\[link\]](#).

2017 — First Microfluidic Haptic Glove — Haptx

In 2017, Haptx announced the first microfluidic haptic glove [\[article link\]](#). It enabled for the first time a practical combination of both tactile and force feedback in a wearable glove interface. They achieved this using miniaturized pneumatic channels filled with microfluidic pressure. The technology was created by Jacob Rubin and Robert Crocket [\[patent link\]](#).



First Tactile and Force Glove, Microfluidic Tactile Elements (Rubin, 2017)

2024 — First Demonstrated Haptic Interface using Brain Stimulation

Developed at the University of Chicago, this prototype system stimulated haptic sensations that were perceived by users in multiple body parts by stimulating the brain. It used transcranial-magnetic-stimulation (TMS) — a non-invasive technique in which electromagnetic pulses stimulate brain areas. This prototype enabled 15 sensations in various body parts (hands, arms, legs, feet, and jaw), by pulsing the user's sensorimotor cortex with a magnetic coil moved mechanically across the scalp [[paper link](#)].



Brain Stimulation Haptics (University of Chicago, 2024)